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Soil microbial communities are shaped by vegetation type and park age in cities under cold climate

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Abstract

© 2017 Society for Applied Microbiology and John Wiley & Sons Ltd Soil microbes play a key role in controlling ecosystem functions and providing ecosystem services. Yet, microbial communities in urban green space soils remain poorly characterized. Here we compared soil microbial communities in 41 urban parks of (i) divergent plant functional types (evergreen trees, deciduous trees and lawn) and (ii) different ages (constructed 10, ~50 and > 100 years ago). These microbial communities were also compared to those in 5 control forests in southern Finland. Our results indicate that, despite frequent disturbances in urban parks, urban soil microbes still followed the classic patterns typical of plant-microbe associations in natural environments: both bacterial and fungal communities in urban parks responded to plant functional groups, but fungi were under tighter control of plants than bacteria. We show that park age shaped the composition of microbial communities, possibly because vegetation in old parks have had a longer time to modify soil properties and microbial communities than in young parks. Furthermore, control forests harboured distinct but less diverse soil microbial communities than urban parks that are under continuous anthropogenic disturbance. Our results highlight the importance of maintaining a diverse portfolio of urban green spaces and plant communities therein to facilitate complex microbial communities and functions in urban systems.

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